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**Development of Techniques for the *In Situ* Observation of OH and HO₂
for Studies of the Impact of High-Altitude Supersonic Aircraft on the Stratosphere**

Final Technical Report
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TECHNIQUES FOR THE IN SITU
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This three-year project supported the construction, calibration, and deployment of a new instrument to measure the OH and HO₂ radicals on the NASA ER-2 aircraft. The instrument has met and exceeded all of its design goals. The instrumentation represents a true quantum leap in performance over that achieved in previous HO_x instruments built in our group. Sensitivity for OH was enhanced by over two orders of magnitude as the weight fell from ~ 1500 to < 200 Kg. Reliability has been very high: HO_x data are available for all flights during the first operational mission, the Stratospheric Photochemistry, Aerosols, and Dynamics Expedition (SPADE). The results of that experiment have been reported in the scientific literature and at conferences. Additionally, measurements of H₂O and O₃ were made and have been reported in the scientific literature.

The measurements demonstrate the important role that OH and HO₂ play in determining the concentration of ozone in the lower stratosphere. During the SPADE campaign, the measurements demonstrate that the catalytic removal is dominated by processes involving the odd-hydrogen and halogen radicals—an extremely important constraint for photochemical models that are being used to assess the potential deleterious effects of super-sonic aircraft effluent on the burden of stratospheric ozone.

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